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MONOGRAPH

ON

THE FOSSIL REPTILIA

OF THE

WEALDEN AND PURBECK FORMATIONS.

SUPPLEMENT No. IX.

Pages 1—19; Plates I—IV.

CROCODILIA

(Goniopholis, Brachydectes, Nannosuchus, Theriosuchus, and Nuthetes).

BY

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SUPPLEMENT (No. IX)

TO THE

MONOGRAPH

ON

THE FOSSIL REPTILIA

OF

THE WEALDEN AND PURBECK FORMATIONS.

(GONIOPHOLIS, BRACHYDECTES, NANNOSUCHUS, THERIOSUCHUS, AND NUTHETES.)

ORDER. *CROCODILIA.*

THE subjects of the present 'SUPPLEMENT' are from the same division ('Feather-bed') of the fresh-water deposits of the Middle Purbeck series as the Mammalian fossils described in the under-mentioned volume,[1] and were disinterred by the skilful and enterprising explorer of that geological series, SAMUEL HUSBAND BECKLES, Esq., F.R.S., to whom the discovery of most of those fossils is due.

The whole of Mr. Beckles' gatherings from the Purbeck shales having been acquired by the British Museum, many slabs with indications of organic remains have been carefully worked out, and the chief parts of the subjects of Plates I—IV have thus been brought to light.

At the first aspect, detecting in the scattered groups of scutes specimens showing the peg (Pl. IV, fig. 3, *a*) and groove (ib., fig. 4, *b*), it seemed as if remains of some young specimens of *Goniopholis* were so exposed. The condition, however, of two of the skulls (Pl. III, figs. 1 and 3) enabled a comparison to be made which determined their specific and, by their dentition, generic distinctions from both *Goniopholis* and *Petrosuchus.* The number of maxillary and mandibular specimens, of which several are figured in Pl. III, exemplified a degree of constancy in size which begat a conviction that such was a character of the species; and, diminutive as were the REPTILIA which have supplied the subjects of both plates, their characters were indisputably those of the Order *Crocodilia.* One of them, by the size and shape of certain teeth, came nearer to *Goniopholis,* another by the same character resembled *Petrosuchus*, but the differential characters were such as could not have been obliterated by growth or age.

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[1] 'Monograph of the Fossil Mammalia of the Mesozoic Formations;' in the Volume of the Palæontographical Society for the year 1870.

A third form of Crocodilian made a nearer approach in one of the species (Pl. I, fig. 2) to the average size of the broad-faced genera. A fourth (ib., fig. 1) corresponded in size with the subject of fig. 2, but offered no character by which it could be legitimately removed from the genus *Goniopholis*. I commence with the description of this small but well-marked species.

Genus—GONIOPHOLIS, *Owen*.[1]

Species—*Goniopholis tenuidens*. Plate I, fig. 1.

The dental character of the Amphicœlian genus *Goniopholis* consists of the numerous close-set, fine, longitudinal ridges of the enamel, two of which, larger and sharper than the rest, traverse opposite sides of the tooth from the base to the apex of the crown, midway between the convex and concave lines of the curvature of the tooth, that is, at the fore and back parts of the crown.[2]

The general shape and proportions of the tooth-crowns indicate distinctions of species of *Goniopholis*. The type of the genus is characterised by the thickness and subcircular section of the crown, and the obtuseness of that in the posterior teeth.[3]

In *Goniopholis simus*[4] the proportion of breadth to length of crown is less than in *G. crassidens*, and this difference is more marked in the specimen from the Featherbed of Purbeck which forms the subject of fig. 1, Pl. I.

This specimen consists of the chief part of the dentary and co-articulated splenial elements of both rami of the same mandible, partially dislocated at the symphysis. The alveolar tract includes the incisive (*i*) and molary (*m*) convexities, without an intervening laniary rising. The incisive convexity includes five sockets, a tooth being retained in the first, third, and fourth on the right, and in the first and third sockets on the left dentary. The foremost tooth has a crown of 6 mm. length and barely 2 mm. of basal breath ; each has partially emerged from a socket larger than itself, and exhibits a portion of a tooth in succession to one which has been lost or shed. The socket is separated by an interval of 2 mm. from the second. This shows a subcircular aperture of 5 mm. in diameter. The third socket opens at 2 mm. distance from the second. The tooth (*b*) in the right dentary shows the inner, longitudinally concave side of the crown, with a basal breadth of 6 mm.

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[1] 'Reports of the British Association,' 8vo., 1841, "On British Fossil Reptiles," part ii, 1841, p. 690.

[2] Loc. cit., pp. 69, 70.

[3] 'Supplement (No. viii) to the Monograph on the Fossil Reptilia of the Wealden and Purbeck Formations,' Palæontographical Volume for the year 1878, p. 1, pl. i, fig. 7.

[4] Ib. Ib., p. 7, pl. v.

and a total length of 16 mm. One may count about a dozen fine longitudinal linear ridges between the fore and hind stronger ones (ib., fig. 1 *b* and *b′*, magn.). The corresponding tooth (ib., fig. 1 *a*, magn.) in the left dentary shows the outer longitudinally convex side of the crown, with about sixteen fine ridges. These teeth answer to, or interlock with, the premaxillary or anterior canines of the upper jaw. The fourth tooth (ib. *c*) is less than the third; its crown projects 10 mm. from the right dentary; the fractured base of the corresponding tooth in the left dentary is 4 mm. in diameter. Seven close-set sockets follow along the feebly concave part of the alveolar tract. The tooth of the twelfth socket at the beginning of the second convexity is preserved in both rami; its crown is 8 mm. in length, 4 mm. in basal breadth, with an obtuse summit, showing the feeblest indication of an apical point. This point is rather better seen in the crown of the next tooth, which has not wholly emerged.

The total number of teeth is sixteen in each of the dentary elements here preserved, and by analogy to the *Goniopholis simus*,[1] the whole, or nearly the whole, of the dental series or sockets, in one dentary element is here exhibited.

The outer surface of the dentary is pitted by small subcircular, not close-set, impressions, except on the outer alveolar plate of the molary rising, where a few longitudinal pits indent the otherwise smooth surface of the bone.

The length of the symphysis is 25 mm., the depth 10 mm. The extreme breadth of the incisive part of the mandible is 32 mm.

The length of the preserved alveolar part of the dentary is 85 mm. (3 inches, 3 lines); the length of the entire mandible might have been between 5 and 6 inches.

Fragmentary evidences of the *Goniopholis tenuidens* in other slabs of matrix do not indicate any individual of a larger size than is exemplified by the above-described portion of lower jaw.

The mandible of *Goniopholis crassidens*, with an extreme depth of 4 inches, attained the length of 2 feet. Of this length the alveolar part of the dentary element occupied, as in most broad-faced Crocodiles, one half. The length of the alveolar part of the mandible of *Goniopholis tenuidens* being 3 inches, the total length of the jaw may be set down at one fourth of that of the type species of the genus.

Genus—Brachydectes, *Owen.*[2]

Species—*Brachydectes major.* Plate I, fig. 2.

In this genus and species a left mandibular ramus, 9 inches 6 lines in length, shows an alveolar tract of but 3 inches 9 lines in length. In the proportion of the jaw, therefore, appropriated to the lodgment of the teeth this Crocodile differs from the rest of the family. The ramus has a less relative depth than in *Brachydectes minor*, fig. 3; it measures in extreme vertical extent, taken at about one fourth of the length from the angle, 1 inch 9 lines, or little more than one sixth the entire length of the ramus, whilst in *Br. minor* the extreme depth of the mandible, which is about midway between the two ends, is nearly one fifth of the entire length of the ramus. This proportion might, however, be deemed an immature character of the smaller specimen, but there are other differences in the jaw of *Brachydectes major* not attributable to age and consequent growth. There is no longitudinal ridge on the angular element. The angle itself is more produced. This process repeats, indeed, the low position characteristic of the genus *Brachydectes*, but the line descending thereto from the articular element is straight, not concave, as in *Br. minor*, and the curve from the angle to the convex border of the angular element (fig. 1, 30) is deeply concave. Moreover, the outer surface of the deep hinder part of the ramus is sculptured with close-set deep pits, giving a strongly reticular character to that part of the bone.

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[1] 'Supplement' (No. viii), *ut supra*, p. 8.

[2] Gr. *βραχὺς*, short; *δηκτὴς*, biter.

The alveolar tract shows, as in *Brachydectes minor*, a laniary convexity (*l*) as well as an incisive one (*i*); both, however, are slight. In the latter the crown of the third or fourth incisor is preserved; it is 20 mm. in length, 6 mm. in basal breadth. The enamel of the exposed outer side is smooth; the fore part of the crown is obtuse, the hind part trenchant, with a faint appearance of minute denticulation. This is the only tooth preserved in the present jaw. There are faint indications of ten or twelve alveoli behind the tooth; two of these in the laniary curve (*l*) indicate teeth proportionally as large as the canine in *Brachydectes minor.* The outer surface of the laniary convexity is smooth. The rugged irregularly and minutely pitted character is continued to the alveolar border of the incisive convexity. The sutures between the dentary and hinder elements of the mandible are not clearly definable. Certain parts of the outer surface which were wanting made it doubtful whether any vacuity between the surangular, angular, and dentary elements existed; and the condition of the jaw of the smaller species weighs in favour of assigning an uninterrupted outer wall of the mandible as an additional differential character of the genus.

The proportion of the incisor tooth approaches that of the third in *Petrosuchus*,[1] but the latter is longer in proportion to the basal breadth. The dental series, and consequently the dentary element, are relatively longer in *Petrosuchus* than in *Brachydectes*.

A second specimen of the left dentary bone repeats closely the same size and characters of the corresponding part of the mandibular ramus above described. The teeth are wanting. Behind the alveolus of the 'anterior canine' are indications of seven or eight following alveoli, not more. The better preserved outer plate of the bone demonstrates the absence of the vacuity which is present in *Petrosuchus*, *Goniopholis*, and *Crocodilia* generally.

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[1] 'Supplement' (No. viii), pl. vi, fig. 3.

Species—*Brachydectes minor.* Plate I, fig. 3.

This species first indicated the genus in the exploratory operations; it is represented by the left mandibular ramus (Plate I, fig. 3), which is remarkable, as in the larger species, for the small proportion which the alveolar tract bears to the entire length of the bone, and for the entireness of the outer wall. The alveolar tract is undulated, showing an incisive and a laniary convexity with intervening and hinder concavities.

The incisive convexity holds five teeth, close set, the two hindmost rather larger than the rest; but no single tooth is so much larger as to suggest the name of 'canine.' The laniary convexity shows one large canine with a broad, straight, laterally compressed crown. It is preceded by a smaller tooth, rather less than the hindmost incisor, and separated therefrom by a space which may have held two or three small teeth. The alveolar tract behind the canine seems to have lodged three or four teeth, the crowns of which are lost.

The whole length of the alveolar tract is 23 mm. (1 inch); that of the entire ramus is 85 mm. (3 inches 2 lines). The dentary element bifurcates behind as usual; the upper prong joining the surangular, the lower and longer one the angular, but without defining or leaving any vacuity; the union where such vacuity would have been left in ordinary Crocodiles is situated well within the anterior half of the ramus. The posterior elements are correspondingly of unusual length; their breadth is also proportionally greater than in previously known Crocodilian mandibles. The length of the surangular element (29′) is 48 mm. (1 inch 10 lines); its depth (vertical breadth) is 13 mm. (6 lines). The upper border describes a feeble convexity; beneath the articular surface of 29 the surangular curves downward and backward, meeting the lower border at a point wedged between the articular and angular elements.

The articular exposes the outer antero-posterior concave border of the joint. From this it descends obliquely backward and joins the angular in forming the process (30′), which here projects directly backward, its termination being much below the joint, and nearly on the level of the lowest part of the lower border of the jaw. The angular element extends forward from the angle, with its lower border at first straight or feebly concave, and then moderately convex to its junction with the dentary; a ridge projects along the greater part of this course a little way above the lower border. A portion of the splenial element shows above the fore part of the surangular, and supplements the inner alveolar wall at the hind part of the dentary.

From the lower jaw of *Theriosuchus* (Plate III, figs. 5, 14, 16) the present differs in the shortness of the dentary element and alveolar series, in the greater depth and verticality of the outer surface of the ramus, and the narrower inferior border. It also offers a generic distinction in the number and shape of the teeth.

The proportional length and slenderness of the dentary and the absence of any laniary convexity succeeding the incisive one, together with greater number and the shape of the teeth of *Nannosuchus* (Pl. II, figs. 8 and 9) offer a more striking contrast with the mandible and teeth of *Brachydects.*

No specimens have been brought to light which show characters of *Brachydectes minor* on a larger scale than is represented by the mandibular ramus above described.

Genus—NANNOSUCHUS,[1] *Owen.*

Species—*Nannosuchus gracilidens.* Plate II, figs. 1—10; Plate III, figs. 1 and 2.

In this genus the teeth have long, slender, sharp-pointed crowns, slightly recurved, mostly sub-circular in transverse section, impressed by a few linear or narrow and shallow grooves. The dental series is pretty uniform as to size and shape of crown, but less so than in the Teleosaur and Gavial; the teeth are also less numerous and wider apart.

The claim to generic distinction indicated by the armature of both upper and lower jaws was established by an additional dental character revealed in the following specimen.

The fore part of the mandible (Plate II, fig. 1) exhibited a tooth *in sitû* (fig. 1 *c* and fig. 2 enlarged), answering to that termed the 'anterior canine' in *Crocodilia,* but presenting characters which I had not before observed in those or other *Reptilia.*

The crown is long in proportion to the basal breadth, conical, recurved, and pointed. It is traversed along the middle of the outer surface by a ridge, or rather a low angle of the enamel, simulating a ridge; between this and the trenchant hind border is included one third of the outer surface of the crown. This tract is smooth, and, transversely, is feebly depressed or concave, giving a trenchant character to the hinder longitudinally concave edge of the crown. The two thirds of the outer, transversely convex, surface of the crown is traversed by close-set linear grooves, and intervening ridges, which mostly subside at the apical half of the crown, leaving about one third of the apex smooth. This tooth appears to be the fourth counting backward; the length of the crown is 10 mm., the basal breadth 3 mm. An enlarged view is given of the outer side of the crown in fig. 2.

The foremost tooth, also preserved (fig. 1, *i*), shows a coronal length of 5 mm., a basal breadth of 1 mm.

The crown of a fifth tooth rises close behind that of the fourth, with a basal breadth of 2 mm, and a length of 5 mm.; it is conical, but is straight. The outer side, uniformly convex, is traversed along the basal half by fine ridges and intervening grooves; it may be that the whole of this crown has not emerged.

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[1] *νάννος*, dwarfish, Σοῦχυς, an Egyptian name of the Crocodile.

The portions of mandible, the subject of fig. 1, consist of the right and left dentary elements, of which the major part is preserved, the rest indicated by impressions on the matrix. The preserved parts include the symphysial expansion, the joint being slightly dislocated through pressure, which has acted obliquely. The right dentary shows its outer side, the left dentary its lower border, and beyond the symphysis a small proportion of the outer surface, while the inner one is partly covered by the smooth splenial element (31).

The breadth of the symphysial part of the right dentary is 15 mm.; the length of the under part of the symphysis is 18 mm. At 33 mm. from the fore end the (vertical) breadth of the ramus diminishes to 10 mm., beyond which it gradually increases to 15 mm., where the bifurcation of the bone begins. The entire length of the part preserved is 114 mm. (nearly 4½ inches).

The exterior of the symphysial part of the dentary is pitted by numerous minute subcircular depressions. As the bone contracts the depressions enlarge and elongate, then take the form of longitudinal grooves of irregular depth; but these become limited to the lower half of the outer side of the dentary, the part above, which forms the outer alveolar plate, being smooth, with a few faint, short, longitudinal linear impressions.

The symphysial expanse of the right dentary shows five sockets, of which, as above stated, the first, fourth, and fifth retain their teeth. The implantation of these teeth in complete sockets confirms the indication by the sculpturing of the bone that the jaw has belonged to a member of the Crocodilian order.

The first tooth was the smallest; the second and third, judging from the sockets, gained in size; the fourth is the largest, and represents, as above remarked, the tooth opposing or interlocking with the premaxillary canine above; the fifth abruptly loses size. Of the succeeding teeth little more can be divined from the present specimen than that they were small or, at least, slender. The convex curve, lengthwise, of the outer alveolar border is very feeble, and seems to have helped to lodge the hinder teeth; it is divided by a long feeble concavity from the symphysial or incisive convexity. There is no laniary rising.

Two smooth bones (31, *x*) contribute to the inner wall of the ramus, as exposed on the left side. If the lower one (*x*) represents the splenial, the upper one (31) would be an unusually developed inner plate of the dentary. If this, however, should be, as its posterior expansion indicates, according to the analogy of the modern Crocodiles, the splenial element (31), then the lower bone (*x*), would represent an angular element unusually produced forward. The longitudinal line of demarcation between these smooth inner questionable elements is not an accidental crack.

The Crocodilian character of the present jaw is supported by the scutes (Pl. II, fig. 4) and impressions (fig. 5) of scutes, by a vertebra (fig. 3), portions of ribs with a bifurcate proximal end, and by a metacarpal bone, all on the same slab of matrix.

The vertebra is Amphicœlian; the neurapophysial suture is unobliterated; it is from the part of the trunk where the rib articulation has risen wholly above the centrum. This element is 13 mm. in length; the non-articular surface is smooth and entire, gradually and slightly expanding to the articular ends; the one exposed being subcircular, 10 mm. in diameter.

Of the scutes preserved the largest are oblong, quadrangular, with a tooth-like process from the anterior and outer angle, from the base of which is continued a raised smooth tract along the anterior border, from 4 to 3 mm. in breadth. The breadth of the entire scute is 17 mm.; the length is 35 mm. Some smaller scutes are pentagonal.

We have here, therefore, evidence of an Amphicœlian Crocodile, with the dermal armour after the type of that of *Goniopholis*, but generically distinct by the characters of the mandibular dentition. If the dentary bone constituted three fourths the length of the mandible this may be reckoned to have been about 6 inches in length, and the entire Crocodile may have been 6 feet in length.

The portion of mandible of which the under surface of the dentary and splenial elements are exposed, forming the subject of fig. 6, Plate II, is shown by certain teeth in place and others scattered near in the same slab, to belong to the same genus and species as that represented by fig. 1, and to have come from an individual of similar size. Both are the largest evidences of *Nannosuchus* shown in the numerous series of Reptilian fossils from the portions of the 'Feather-bed' formation now under review.

The symphysis, 21 mm. in longitudinal extent, forms a fifth part of the preserved extent of the dentary; the breadth of this part of the jaw is 30 mm.; that behind the symphysis is 27 mm. The rami, as far as they are preserved, diverge to a breadth of 70 mm.

The alveolar part of the symphysis describes an incisive convexity, and the sockets indicate one or two teeth of larger size and thicker proportions than those of the rest of the dental series. The crowns of two of these teeth, which had become detached, are fortunately preserved, near the fore part of the jaw. The largest (fig. 7, magn.) represents the 'anterior canine,' and is the homologue of fig. 1 *c* and fig. 2, magn. It shows the well-marked characteristics of that tooth in *Nannosuchus*, and, besides the difference of sculpturing, the crown is more strongly curved than in *Goniopholis* or *Petrosuchus*. The second detached tooth near the incisive alveoli shows both root and crown. The latter is but half the length of that of the 'canine;' more of the convex side is exposed than in fig. 2; it is traversed by fine longitudinal ridges. The teeth which are in place show a smaller size and more slender pointed crown. There is no evidence of any tooth equalling in size the largest of the symphysial or incisive series.

The numerous minute circular pits sculpturing the symphysial expansion change, as in the specimen (fig. 1), to coarser and larger longitudinal impressions as the rami recede and pass backward; and the surface near the alveolar border showing the feeble molary convex curve is smooth.

The dental character of *Nannosuchus* is more fully exemplified by smaller specimens, of which two, forming parts of the lower jaw, will be first noticed.

The subject of fig. 8, Pl. II, includes the dentary and angular elements, partially dislocated, of the right mandibular ramus. Two of the molary series of teeth are *in sitû*, showing long, slender, feebly recurved crowns, each 5 mm. in length; other teeth of similar shape and with finely striate enamel are on the same slab.

In a smaller dentary (Pl. II, fig. 9) the sockets of eighteen teeth are visible. The proportions and outer markings agree with those of the larger specimen.

The humerus (fig. 10), preserved near the jaw, shows the usual Crocodilian characters, with more slender proportions than in *Crocodilus niger;* it rather resembles that of the Gavial.[1]

The characters of *Nannosuchus* yielded by the foregoing specimens are supplemented by those of the skull represented of the natural size in Pl. III, fig. 1. The teeth preserved *in sitû* and detached, but in contiguity with the alveolar border, are generically those to which they would be opposed assuming the skull to be that of a *Nannosuchus.* The inferiority of size is not shown by any other distinctive character to indicate a species other than that founded on the lower jaws above described.

As in those, the teeth of the upper jaw are divided by intervals usually greater than their basal breadth. Each premaxillary (fig. 1, 22) had four teeth at least; the maxillary had not fewer than ten teeth.

The characters of length and slenderness of crown in the teeth of this small Crocodile suggested a comparison of its skull with that of *Petrosuchus*,[2] but the differential characters exceed in importance those of size. The upper jaw of *Nannosuchus* does not contract so rapidly, or in so great a degree in advance of the orbits, as in *Petrosuchus;* it is also shorter as well as broader; no amount of growth could have converted it into the slender elongate shape which approximates *Petrosuchus* to the gavial-like *Crocodilus cataphractus.*

The hind border of the parieto-mastoid platform is undulate; gently convex at the middle, where it is formed by the parietal (ib., 7), concave on each side, where it is carried out by the mastoids (ib., 8).

In *Crocodilus niger* this border is straight; in *Croc. palustris* it is undulate, but the middle parietal convexity is much less than the lateral, concave, mastoidean curves, owing to the relatively narrower extent of the parietal bone. The lateral borders of the supra-cranial platform, due to the mastoids (ib., 8) and post-frontals (ib., 12), present, in *Nannosuchus*, a gentle sigmoid curve. In most modern *Crocodilia* these borders are straight, running parallel in *Croc. niger*, slightly convergent forwards in *Croc. cataphractus* and *Croc. intermedius.*

The breadth of the platform is to that of the skull, taken across and including the zygomatic arches, as 8 to 10 in *Nannosuchus ;* in *Croc. niger* the platform is little more than half the breadth of the skull taken across the hind part of the parieto-mastoid or upper temporal apertures; in *Croc. palustris* the platform occupies half the breadth of the skull taken at the same part.

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[1] 'Catalogue of Osteology, Mus. Coll. Chir.,' 4to, 1853, p. 153, No. 691.

[2] Supplement (No. viii) in Palæontographical Soc. Volume for 1878, Plate VI.

The upper temporal apertures (T) have the same relative size as in *Petrosuchus,* but they differ in shape, being less circular, the longer diameter being longitudinal, or in the skull's axis. As far as the orbits are preserved these do not exceed in size the upper temporal apertures. This character of the Mesozoic Crocodile is retained in the present dwarf species. A super-orbital bone strengthened the upper eyelid; it retains its connections with the frontal (11), post-frontal (12), and pre-frontal (14) in the left orbit (*o*); but has become slightly detached in the right orbit (*o′*). The nasal bones (15) terminate in a point distant from the external nostril by rather more than the diameter of that aperture, which accordingly is single and exclusively bounded by the premaxillaries. In this character *Crocodilius cataphractus* and *Croc. intermedius* resemble *Nannosuchus ;* but the upper jaw is longer and more slender in proportion in both these existing Crocodiles than in the Purbeck species; in both, also, the upper temporal apertures are relatively smaller than in *Nannosuchus.*

In the character of the nasal bones and conformation of the external nostril *Nannosuchus* resembles *Goniopholis,*[1] but the supra-temporal apertures are more oblong and the maxillaries are not so out-swollen as they approach the premaxillaries. The facial part of the skull, from the front border of the orbit forwards, equals the extent of the skull from the same part to the occiput in *Nannosuchus ;* in *Goniopholis* the facial part of the skull, so defined, is one third longer than the extent behind. The mutilated state of the unique skull of *Petrosuchus*[2] prevents a similar comparison being made.

The sculpturing of the upper surfaces of the exposed parts of the skull in *Nannosuchus* presents the common Crocodilian character of minute subcircular pits, leaving a reticulate disposition of the intervening bone.

Genus—Theriosuchus,[3] *Owen.*

Species—*Theriosuchus pusillus.* Plate III, figs. 3—16 ; Plate IV.

This Crocodile, somewhat smaller in size than the preceding species, approaches nearer to the type of the broad-faced Alligators in the proportion of the antorbital part of the skull.

The dentition is more modified than in any other known Crocodile, recent or extinct, and approaches that which characterises the Theriodont order of Triassic Reptilia.

[1] Supplement, &c., No. viii, Plate V, fig. 1, *t*.

[2] Gr. *θηριον*, wild beast ; *σοῦχυς*, crocodile.

[3] Supplément, &c., No. viii, Plate VI, fig. 1.

The premaxillary teeth are five in number in each bone; the three middle ones subequal, the first and fifth smaller. The maxillary teeth are divisible into laniaries and carnassials or trenchant molars. The first maxillary tooth is small (Pl. III, fig. 5); the second and third gain quickly in size, the latter (*a*) assuming the character of a canine; the fourth tooth (*b*) is a still larger canine; the fifth (*c*) and sixth (*d*) decrease in size somewhat suddenly, but in length rather than breadth of crown, and terminate the series projecting from the convex part of the alveolar border of the maxillary. The tooth *c* or *d* may be said to terminate the laniary series. Beyond *d* the teeth lose length and slightly gain in breadth; the crown assumes a triangular, laterally compressed, or lamellate form, and the enamel is transversed on the outside by fine but distinct lines (ib., fig. 6, *e*). Of these sectorial or carnassial molars some of the detached specimens of maxillary (figs. 7 and 11) indicate as many as eight or nine. The broad base or root of each tooth is not inserted into a separate and complete socket, but is lodged in a recess of the outer alveolar wall; moreover, the partitions between these recesses are low or partial, and the teeth appear to have been applied thereto, without being so completely confluent therewith, as in the pleurodont mode of fixation of the teeth in certain Lizards. Hence, in some of the specimens of the maxillary bone the incisors and canines only are retained, being rooted each in its own complete socket; while the molars have fallen out, and their partially separated recesses are shown, as in figures 7 and 11.

In the lower jaw the foremost tooth is rather larger than those which interlock with the middle premaxillary or 'incisor' teeth above; but not any of the succeeding laniary teeth attain the size of the upper canines. The twelfth tooth, counting backwards, assumes the lamellate, triangular shape of striate crown characteristic of the superior sectorials; and the inferior ones were lodged, like those above, in a common depression of an outer alveolar wall, developing the ridges dividing such depression into the dental recesses, as shown in fig. 16, Pl. III. This approximation to a Lacertian dental character might seem ground for something more than a family section of the order *Crocodilia;* but the quasi-pleurodont attachment of the hinder teeth in *Theriosuchus* is only an extension of the character affecting some of the teeth in existing species of Crocodile.[1]

In the cranial platform of *Theriosuchus* the medial parietal part of the hind border is less convex and the two outer parts are more concave by reason of the further backward production of the mastoids than in *Nannosuchus*. The lateral borders of the sculptured part of the platform are more convex than in that genus. This is owing to the greater proportion of the outer and posterior angles of the platform which is abruptly depressed below the level of the sculptured surface of the mastoid, and which becomes smooth like the contiguous and lower-placed tympanic. This character, shown in the subject of fig. 3, Pl. III, usefully indicated fragmentary parts of the skull of other individuals of the species, such as are figured in fig. 1, 12′, Pl. IV. The supra-temporal vacuities are relatively larger than in *Nannosuchus*. The intervening tract of the parietal, rather more canaliculate than in *Nannosuchus*, is divided by a mid ridge in two of the cranial specimens, and partially so in the more complete skull.

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[1] It is noted in the *Alligator niger*. "No. 765. The right ramus of the lower jaw, from which the posterior part of the inner alveolar wall has been removed, showing the five posterior teeth lodged in a common alveolar groove." 'Osteological Catalogue, Museum of the Royal College of Surgeons,' 4to, vol. i, p. 167 (1853).

No palpebral ossicle is preserved in the orbit (*o*). The pointed ends of the nasals are produced so as to divide the outer nostril into two, as in some specimens of *Crocodilus niger;* were this a character of generic value, it might unite *Theriosuchus* with *Halcrosia*, Gray.[1]

The alveolar part of the maxillary in which the canines are developed make a corresponding convex extension of its outer border, as in *Goniopholis*.

The extent of the 'symphysis mandibulæ' and the angle of divarication of the rami are shown in fig. 4, Pl. III.

The matrix was removed as far as practicable from the palatal surface of the skull (fig. 4) and exposed a portion of the basisphenoid (5), of the pterygoids (24), of the palatines (20), and palatal plates of the maxillary (21) ; the pterygo-maxillary vacuities (*y*) and the hind portion of the palatonares (*n*) were brought into view. What seems to be a portion of the hind part of a mandibular ramus was so wedged down upon a part of the palatal surface that, in regard to the fragile character of this unique skull, it was deemed unadvisable to attempt its removal.

In Pl. IV a portion of the skeleton of *Theriosuchus pusillus* is figured. It is of one individual. In the slab of matrix in which it is imbedded the fore part, marked A, A, is continued on from the hind part with an interval of the extent marked B. At this interval the slab has been broken across, but the parts appear to have been naturally readjusted before the specimen was fixed in its present frame. The position in which the two portions of the skeleton are figured relates to the convenience of size of the Plate.

The skull has been displaced and fractured, but the contiguity of the preserved portion with the vertebral column supports the conclusion that it formed part of the skeleton of the same individual. It thus serves to determine the species to which the subject of Plate IV belonged.

The part of the skull includes the parieto-mastoid platform (7, 12′) with the tympanic (28) and the squamosal (27). The articular surface of the tympanic for the mandible shows the Crocodilian character. The median or sagittal ridge of the parietal is well marked, and is continued along the mid-frontal. This character is partially effaced by mutilation in the more entire skull (Pl. III, fig. 3). It is well shown in the frontal bone indicating the largest of the specimens of *Theriosuchus* (Pl. III, fig. 8).

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[1] 'Trans. Zool. Soc.,' vol. vi, p. 135.

The vertebral centrums of the trunk show the shallow Amphicœlian character of those of the *Goniopholis* and Teleosaurians. The smooth under or dermal surface of part of the two median rows of the dorsal scutes are shown in the fore half of the skeleton. In the hind half the upper or epidermal surface of the scutes is exposed, showing in most the submedial longitudinal ridge. This is wanting in certain, probably lateral, scutes, of which a group is exposed at the fore part of the anterior portion of the skeleton. One of these unridged, but toothed, scutes is figured at fig. 3, Pl. IV.

Of the limb-bones preserved may be recognised the right scapula (51) and humerus (53), the left humerus (53) with the radius (54) and ulna (55), followed by some dislocated metacarpals and phalanges of the fore-foot.

In the hind portion of the skeleton (fig. 2) the right femur (65), tibia (66), fibula (67), with the four metatarsals and scattered phalanges, are preserved.

All the limb-bones show the ordinal Crocodilian characters, but the proportion of the fore to the hind limb is that of the Procœlian division, not that of the Teleosaurs.[1] In this respect, as in the proportions of the maxillary bones and teeth, the advance to Tertiary types of Crocodilia is manifested. As in these the *Theriosuchus* was better adapted for locomotion on dry land than were the Teleosaurs.

In *Theriosuchus* the breadth and shortness of the antorbital part of the skull in proportion to the part behind exceeds that in any modern broad-snouted Crocodile. Even in the young 'Crocodile à deux arrêtes,' figured in Pl. I of Cuvier's 'Ossemens Fossiles,'[2] a transverse line across the fore part of the orbits equally bisects the skull, omitting the mandible. In *Theriosuchus* the same line leaves in advance six thirteenth parts of the length of the skull.

This proportion suggested at first view the immature state of the individual to which the subject of fig. 3, Pl. III, had belonged; but of the numerous evidences of *Theriosuchus pusillus* none were larger than those figured in Pl. IV, and in figs. 3, 4, 8, 14, 16, of Pl. III: several other fragmentary evidences had come from smaller individuals.

I conclude, therefore, that, as in the case of most species notable for their diminutive size, immature characters of the larger species of the genus are associated with such dwarfishness of the adults. The only known mammals of the Purbeck period characteristic, moreover, like the dwarf Crocodiles, of the fresh-water 'Feather-bed' deposits, are of diminutive size, and the carnivorous Saurians seem to have been thus adapted in dimensions and force to their prey.

I estimate the average length of a mature *Theriosuchus* at 18 inches. The length of the skull, taken as that of the mandible, is 3 inches 6 lines. In the articulated skeleton of a modern Crocodile the angle of the lower jaw extends to the third cervical vertebra.

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[1] Compare Tab. XI, 'Monograph on the Fossil Reptilia of the London Clay,' part ii, *Crocodilia* and *Ophidia*, Palæontographical volume, 4to, 1850.

[2] Quarto, tom. v, 2de partie.

In *Alligator lucius* the trunk from the third cervical to the last sacral vertebra inclusive is nearly equal to two lengths of the skull; the length of the tail is $2\frac{1}{3}$ lengths of the skull. The trunk of *Theriosuchus* so defined includes two lengths of the skull. The tail, as indicated by fig. 2, Pl. IV, equalled $2\frac{1}{3}$ lengths of the skull.

In the long-jawed Gavials and Teleosaurs the trunk includes about $1\frac{1}{4}$ length of the skull; but the tail is proportionally longer than in the short- and thick-jawed Crocodiles.

CROCODILIAN VERTEBRÆ. Plate I, figs. 4—12.

Of the numerous scattered vertebræ in the different slabs of the Purbeck matrix those specimens have been selected for figuring which exemplify the Crocodilian characters of different portions of the vertebral column.

The subject of fig. 4, Pl. I, is from the neck or fore part of the trunk, in which the hypapophysis (*hy*) has not subsided on the under surface of the centrum; the processes for the head ('parapophysis,' *p*) and tubercle ('diapophysis,' *d*) of the proximally bifurcate rib are well developed. The pre- (*z*) and post- (*z'*) zygapophyses, together with the neural spine (*n. s.*), complete the series of developments of this complex type of Crocodilian vertebræ.[1]

Figs. 5 and 6 are two consecutive, but slightly dislocated, vertebræ from the hinder part of the trunk. The long and broad diapophyses show the notch (*d*) where the simple and short hinder ribs were articulated, each by a single joint, with the rest of their osseous 'segment' or vertebra.[2]

Figs. 7 and 8 are side views of mutilated hinder trunk vertebræ.

Fig. 9 gives a back view of one of the sacral vertebræ, showing the robust processes represented by coalesced pleurapophyses. The suture is traceable by which the latter articulate with both centrum and neural arch.[3]

Fig. 10 is a caudal vertebra, with the hæmal arch and spine (*h*); a front view of the latter is given in fig. 11; the vertebra is from that part of the tail where the pleurapophyses cease to be developed.[4]

Fig. 12 shows the completely ossified substance in a section of a dorsal centrum.

Fig. 13 probably belonged to *Brachydectes minor*.

All these and other detached vertebræ indicate the dwarfed proportions of the *Crocodilia* characteristic of the fresh-water deposits of the 'Feather-bed.' Many

[1] No. 687, Osteological Catalogue, 1853.

[2] No. 689, op. cit., p. 153.

[3] It accords with the character of the sixth cervical vertebra in *Gavialis gangeticus* ('Catal. of Osteology, Mus. Coll. Chir.,' 4to, vol. i, p. 152, No. 684), save in the minor devolopment of the hypapophysis, which indicates a position in the vertebral column somewhat further back.

[4] See No. 686 of the same series and 'Catalogue,' loc. cit.

correspond in size and shape with those shown *in sitû* in *Theriosuchus,* Pl. IV. The subjects of figures 4—10 I am disposed to refer to *Nannosuchus.*

CROCODILIAN SCUTES. Pl. II, fig. 4, 5, 11, 12.

In almost every slab containing Crocodilian remains are scutes, or portions or impressions of scutes. They include the 'peg-and-groove' type, the hexagonal with sutural margins, and the ordinary quadrate with bevelled edges, either plain or single-ridged. All show the Crocodilian pitted or reticular sculpturing on one side, the smooth surface on the opposite.

The scutes exemplified in Plate II, figs. 4 and 5, partly by portions, partly by impressions, may be referred both by contiguity and proportional size to the larger examples of *Nannosuchus gracilidens.* Some scutes of this type, of rather larger size, and with the smooth, overlapped, anterior border relatively broader and more elevated than in *Goniopholis crassidens,*[1] may belong to the smaller species of *Goniopholis* (*G. tenuidens*) or to the larger kind of *Brachydectes.* A smaller-sized peg-and-groove scute would fit *Brachydectes minor;* the smallest and most numerous of all are commonly associated with evidences of *Theriosuchus pusillus.*

The most instructive scutal fossils are those which exemplify the relative position and mode of interlocking of the articular mechanism. Of these are figured two groups, one showing the outer (ib., fig. 11), the other the inner (ib., fig. 12) surfaces.

These specimens afford grounds for additions to the original description of the peg-and-groove modification of Crocodilian armature.

To the "process continued from *one of the angles* vertically to the long axis of the scute "[2] may be added " from the anterior and external angle ;" and for " the depression on the opposite angle of the adjoining scute " may be written " on the under surface of the posterior and external angle of the scute in advance."

When the medial dorsal series of scutes are seen in natural connection from the outer surface the articulating peg is concealed, as in the two hinder pairs of the three shown in fig. 11, Pl. II. When the inner surface of a similar series is exposed, as in fig. 12, the mode of application of the pegs and grooves comes into view.

The scutes of the two medial rows along the back of these Purbeck Crocodiles join each other at the medial line by a close contact of the inner borders—a kind of 'harmonia' or toothless suture. Ventral scutes usually show thicker, more sutural, margins. The dorsal scutes upon the tail lose the peg and groove, are longest in longitudinal diameter, and mostly support a longitudinal submedial ridge on the outer surface; at least in *Theriosuchus pusillus* (Pl. IV, fig. 2).

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[1] 'Supplement,' No. viii; Pal. Vol., 1878, p. 2, Pl. IV, fig. 1.

[2] 'Report on British Fossil Reptiles,' 1841, p. 70.

Genus—Nuthetes, *Owen.*[1]

Species—*Nuthetes destructor.*

In a former 'Monograph on the Fossil Lacertian Reptiles of the Purbeck Limestones' the above genus and species were founded on portions of jaw and teeth, kindly transmitted to me by Charles Wilcox, Esq., of Swanage, Dorsetshire.

In Mr. Beckles' collection further evidence of *Nuthetes destructor* is afforded by the portions of jaw (Pl. II, figs. 13 and 14) and by numerous detached teeth, ranging in size from a length of enamelled crown of 5 mm. to 20 mm. (fig. 15, *c*), and with variations in the proportion of length to basal breadth (comp. fig. 15, *d*, *e*, with *a*, *b*).

The teeth in the mandibular fragment accord in size and shape with those of the original or type specimen;[2] they are laterally compressed, strongly recurved, and combine a basal fore-and-aft breadth of 3 mm. with the length of 5 mm. (straight). They likewise show the "excavation or longitudinal depression on the side of the base."[3] The coronal enamel does not extend over this depression, but is continued along its margins, and to a greater extent on that next the convex border of the crown than on the opposite side. In the portion of jaw, originally figured, with seven more or less perfect tooth-crowns, two of these indicate a longer and more slender shape than the rest. Several detached teeth of this type have been exposed in portions of the 'Feather-bed Marl' in the Becklesian series. Some of these, exemplifying difference of size, are figured in Plate II, fig. 15.

In all these tooth-crowns the characteristic fore and hind finely denticulate ridges are discernible, as shown in the magnified view (fig. 16); the rest of the enamel is smooth and even, as in the type of *Nuthetes destructor*. Of this species I am disposed to regard the specimens above described as indicative of the range of size according to growth of individuals rather than as exemplifying specific modifications of the genus.

Dermal Bones ('granicones').

In many portions of the matrix of the 'Feather-bed' are ossicles of a conical shape. the cone showing various degrees of elevation, with a granulate surface, the base being flat and smooth, or faintly and minutely pitted. These 'granicones' I regard as dermal bones,

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[1] 'Monograph on the Fossil Lacertian Reptiles of the Purbeck Limestones,' Palæontological Society's volume, issued for 1858, p. 31. 1861.

[2] 'Quarterly Journal of the Geological Society,' 1854, p. 120.

[3] Ib., ib.

In fig. 18, Pl. II, is represented a 'granicone' with a basal breadth of 8 mm., and a length or height of cone of 14 mm. In Fig. 19 the base is oblique, reducing the shortest side of the cone to a height of 8 mm. In this, as in some of the similarly shaped 'granicones,' part of the basal margin is raised or prominent, sometimes formed by a single series of close-set granules, as in Fig. 20. Those on the surface of the cone are less regularly disposed, but at some parts affect a longitudinal arrangement (Fig. 21.) The apex shows various degrees of obtuseness, which finally reduces the granulate or exterior surface of the cone to a moderate convexity, but the conical shape is the rule. The smallest of such 'grani-cones' has a basal breadth of 3 mm., a length of 5 mm.

Slices of these enigmatical fossils prepared for the microscope demonstrated the absence of the structures characteristic of piscine dermal bony cones and spines. Moreover, the geological deposit (a subdivision of the Purbeck series) containing the granicones is a fresh-water one, and their structure was equally distinct from the ganoid dermal defences of the *Sturionidæ* or other fishes habitually frequenting lakes or rivers. The dermal scutes of *Theriosuchus* are notable for the greater number of the canaliculi, and the more regular 'lay,' or disposition, of the 'lacunæ' or bone cells, than in Lacertians; also by the wider 'sinuses' or unossified tracts. In the dimensions, size, shape, and number of the 'canaliculi;' in the minor regularity of the 'lay' of the lacunæ, and in the less proportion in both number and dimensions of the sinuses, the bony tissue of the granicones resembled that in Lacertians; and in this conclusion from microscopical characters,[1] combined with the evidence of the association, and the contiguity of the granicones, with the unquestionable fossil remains of *Nuthetes destructor*, I derive the grounds for referring them to that extinct genus and species.

Among modern Lizards the singular '*Moloch horridus*' of Australia exemplifies dermal scutes most nearly resembling these 'granicones' in shape; but the horny exterior is supported by dense fibrous tissue, not bone. It may be that we have in them a formal exemplification of the dermal armour of *Nuthetes destructor*. If so, the association of a Lizard of such forbidding physiognomy with small Marsupials having their nearest of kin in Australia would be worthy of note.

At the conclusion of my former Monograph on Mesozoic (Wealden and Purbeck) *Crocodilia*, allusion was made to the differences they presented in characters of the bony palate, extent of attachment of mandibular muscles, vertebral articulations, and dermal armature, from the Neozoic *Crocodilia*; differences which suggested the relation of such modifications in the Tertiary and existing Crocodiles and Alligators to freer or more frequent life on dry land, and greater power of grappling with and drowning large terrestrial mammals.

One of these reptiles having seized and submerged a tiger or buffalo, admits the water into its wide, unlabiate mouth, by the spaces to which the thickness of the part of the prey gripped keeps asunder the upper and the lower jaws. Thus, the part of the mouth not occupied by the prey is filled with the fluid in which the mammal is being dragged and drowned. "The closure of the exterior nostrils"[1] would not prevent the water entering the 'glottis.' A special arrangement is requisite for this purpose, and such arrangement, as it exists in Neozoic Crocodiles, is incompatible with the relative position of "the posterior nares" and the glottis in the Mesozoic Crocodiles. The question is, with a closure of the external nostrils and the exclusion of water admitted by the mouth into the nasal passage, how is the water to be prevented from getting into the windpipe? We know how this is effected in the Cetaceans; and modern Crocodiles have as efficient a mechanism to the same end though on a different plan, but requiring a size and position of the palatonares which constitutes one of the best marked cranial characters differentiating the Mesozoic and Neozoic *Crocodilia.*

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[1] See 'Journal of the Royal Microscopical Society,' vol. i, No. 5, p. 233, pls. xii and xiii.

In all the Crocodiles contemporary with "large and active mammals"[2] there is a double valvular structure at the back of the mouth, which prevents the water having access to the mouth, from entering either the hinder nostril or the glottis. A membranous and fleshy fold hangs, like a curtain, from the hind border of the roof of the mouth, and answers to our 'velum palati:' the other valve is peculiarly crocodilian; it is a broad, gristly plate, which rises from the root of the tongue, carrying with it a covering of the lingual integument; and, when the palatal valve is applied to it, they form together a complete partition wall, closing the back of the mouth, between which and "the posterior nares" it is situated, shutting off both the latter aperture and the glottis from the mouth.

To make this mechanism available, the hind nostril is reduced in size, and such reduction is shown in the skull. The palatonaris is also placed far back, and its plane instead of being horizontal is tilted up at the angle which makes the operation of the two parts or folding doors of the partition most effective in closing the oral chamber posteriorly.[3] If the submergence of the Crocodile, with its "large mammalian"[4] prey, should last so long as to render it needful for the reptile to take a fresh breath, it can protrude its prominent snout from the surface of the river, and inhale a current of air which will traverse the long meatus and enter the glottis by the chamber common to nose and windpipe, which is shut off from the mouth by the above-described structures. We have no ground for inferring such from the bony palate in amphicœlian Crocodiles; the difference in its size and position are such as to have deceived both Bronn and De Blainville as to the position and homology of the palatonares in *Teleosaurus.*[5]

The subjects of the present Monograph bear unexpectedly, and in an interesting degree, on another objection, raised during the discussion at the Geological Society of

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[1] 'Quart. Journ. of Geol. Soc.,' May, 1878, p. 429.

[2] Loc. cit., p. 425.

[3] 'Proceedings of the Zool. Soc.,' October 25th, 1831, p. 139.

[4] Ib. ib., p. 426.

[5] 'Abhandlungen über die Gavial-artigen Reptilien der Lias-formation,' fol., 1841, pp. 12, 16, 24.

London, on the topics touched upon at the conclusion of the preceding Monograph, and subsequently submitted in greater detail to that body. The objection was, that "warm-blooded animals did actually exist contemporaneously with the Mesosuchian Crocodiles."[1] As the only examples of the Mammalian class of which I was cognisant were the subjects of the undercited Monograph,[2] and a few other species of like diminutive size, it did not seem to me to affect a question exclusively bearing upon "large Mammalian quadrupeds."[3] It seems, however, that the Crocodiles which most abounded, if we may judge from the proportion of their fossil remains in the fresh-water deposits of the 'feather-bed' subdivision of the Purbeck series, were related in size to their contemporary diminutive Mammals. The Spalacotheres, Peralestes, Stylodons, Triconodons, &c., may well have been the prey of the dwarf Crocodiles of the locality. For these were reduced to dimensions which forbade them to disdain such succulent morsels, and at the same time they were suitably armed and limbed for the capture of the little Marsupials.

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[1] Hulke, 'Quarterly Journal of the Geological Society,' May, 1878, p. 428.

[2] "On the Fossil Mammalia of the Mesozoic Formations," Palæontographical Soc. Volume for 1870.

[3] 'Quart. Journal,' *ut supra*, pp. 425, 426.

PLATE I.

Genus—GONIOPHOLIS.

FIG.

1. Dentary portions of the mandible of *Goniopholis tenuidens:* 1 *a,* outer side of anterior canine; 1 *b,* inner side of anterior canine: *b′,* the same magnified.

Genus—BRACHYDECTES.

2. Side view of left mandibular ramus of *Brachydectes major.*
3. Side view of left mandibular ramus of *Brachydectes minor.*

Order—CROCODILIA.

4. Front view of an anterior trunk-vertebra.
5. Upper (neural) view of a posterior trunk-vertebra.
6. Upper (neural) view of a following vertebra.
7. Side view of a trunk-vertebra.
8. Side view of a trunk-vertebra.
9. Back view of a sacral vertebra.
10. Side view of a caudal vertebra.
11. Front view of hæmal arch and spine of do.
12. Longitudinal vertical section of the centrum of a trunk-vertebra.
13. Side view of three dorsal vertebræ of *Brachydectes minor*?

The figures are of the natural size save where otherwise expressed.
From the Middle Purbeck; in the British Museum.

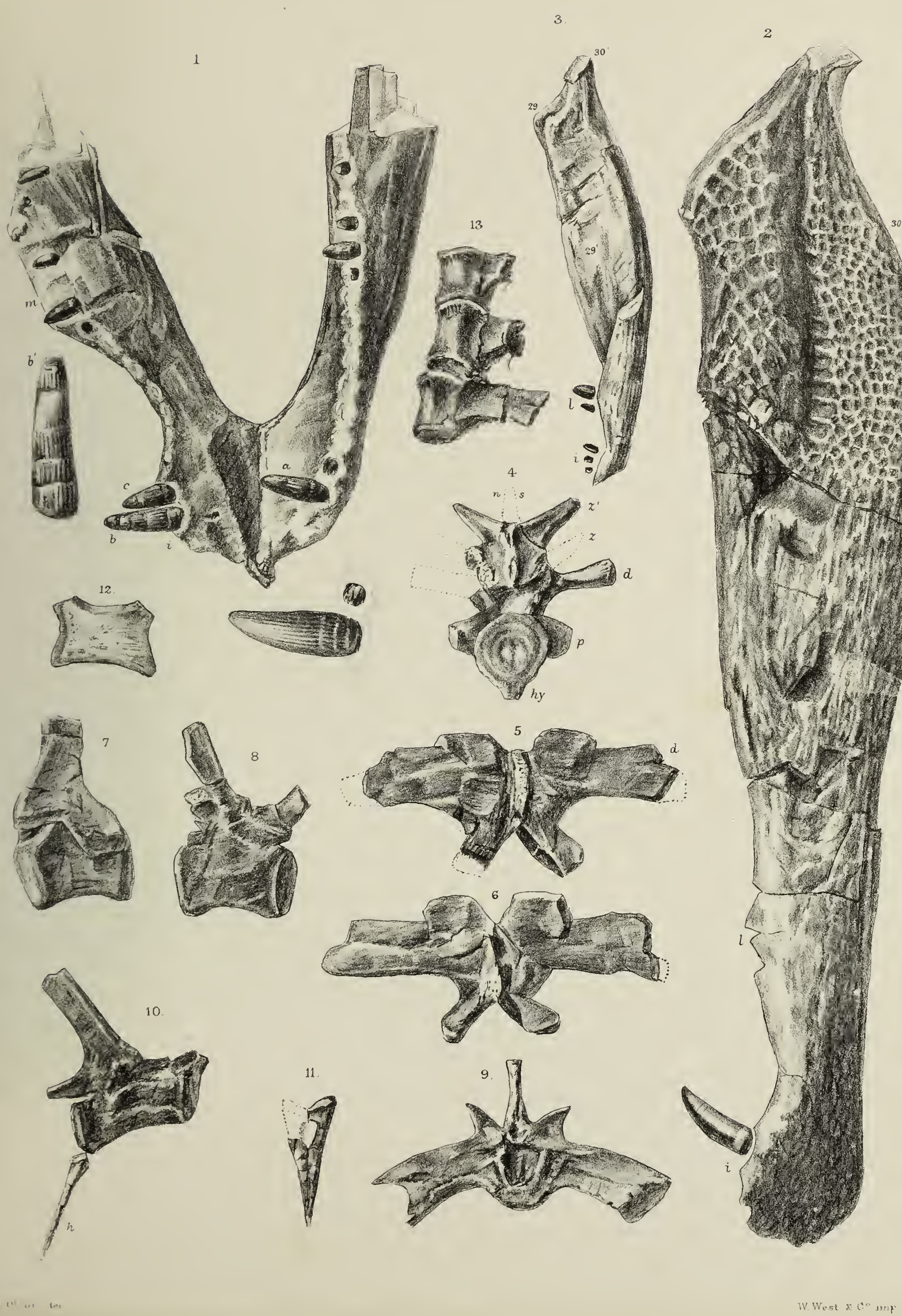

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PLATE II.

Genus—NANNOSUCHUS.

FIG.

1. Dentary portions of mandible of *Nannosuchus gracilidens.*
2. Outer side of right anterior canine of do., magn.
3. Oblique view of a trunk-vertebra of do.
4. Portion and impression of a dorsal scute of do.
5. Portion of a larger dorsal scute of do. (the subjects of figs. 3, 4, and 5, are on the same slab as fig. 1).
6. Under view of dentary portions of mandible of *Nannosuchus gracilidens.*
7. Detached anterior canine of probably the same mandible.
8. Outer side view of right ramus of mandible of *Nannosuchus gracilidens* (the ends are drawn too far apart).
9. Portions of dentary elements of mandible of do.
10. Humerus of do.

Incertæ species.

11. Outer view of three pairs of dorsal scutes.
12. Inner view of four pairs of dorsal scutes.

Genus—NUTHETES.

13 and 14. Portions of mandible and teeth of *Nuthetes destructor.*
15. Five detached teeth of do.
16. Side view of crown of a tooth of do., magn.
7—21. Dermal bones or 'granicones,' probably of *Nuthetes.*
22. Section of a granicone, magnified 12 diameters.
23. Ib. ib. magnified 500 diameters.

Genus—THERIOSUCHUS.

24. Anterior caudal vertebra, with articular end in outline.

The figures are of the natural size save where otherwise expressed.
From the Middle Purbeck; in the British Museum.

PLATE II.

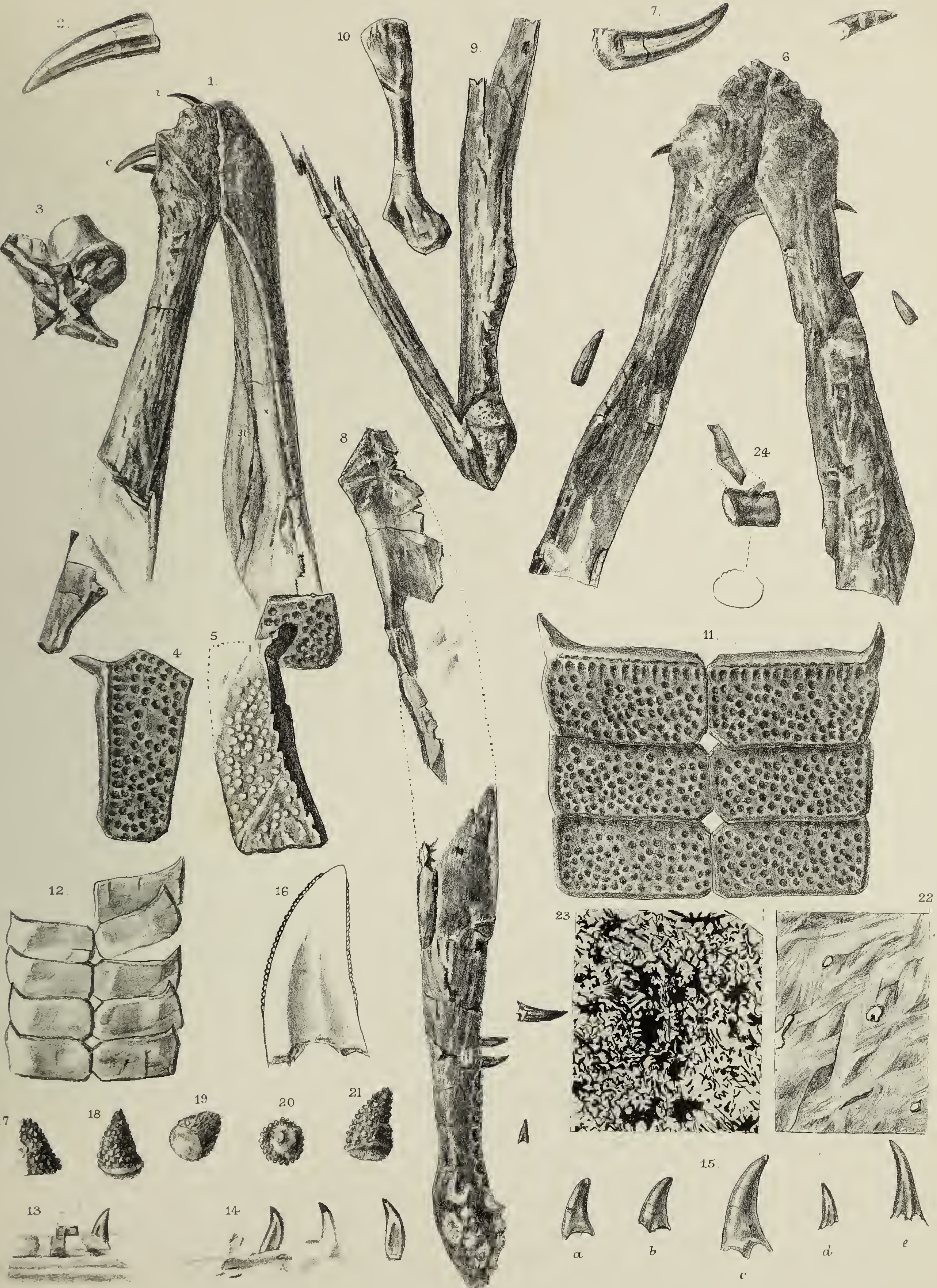

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PLATE III.

Genus—NANNOSUCHUS.

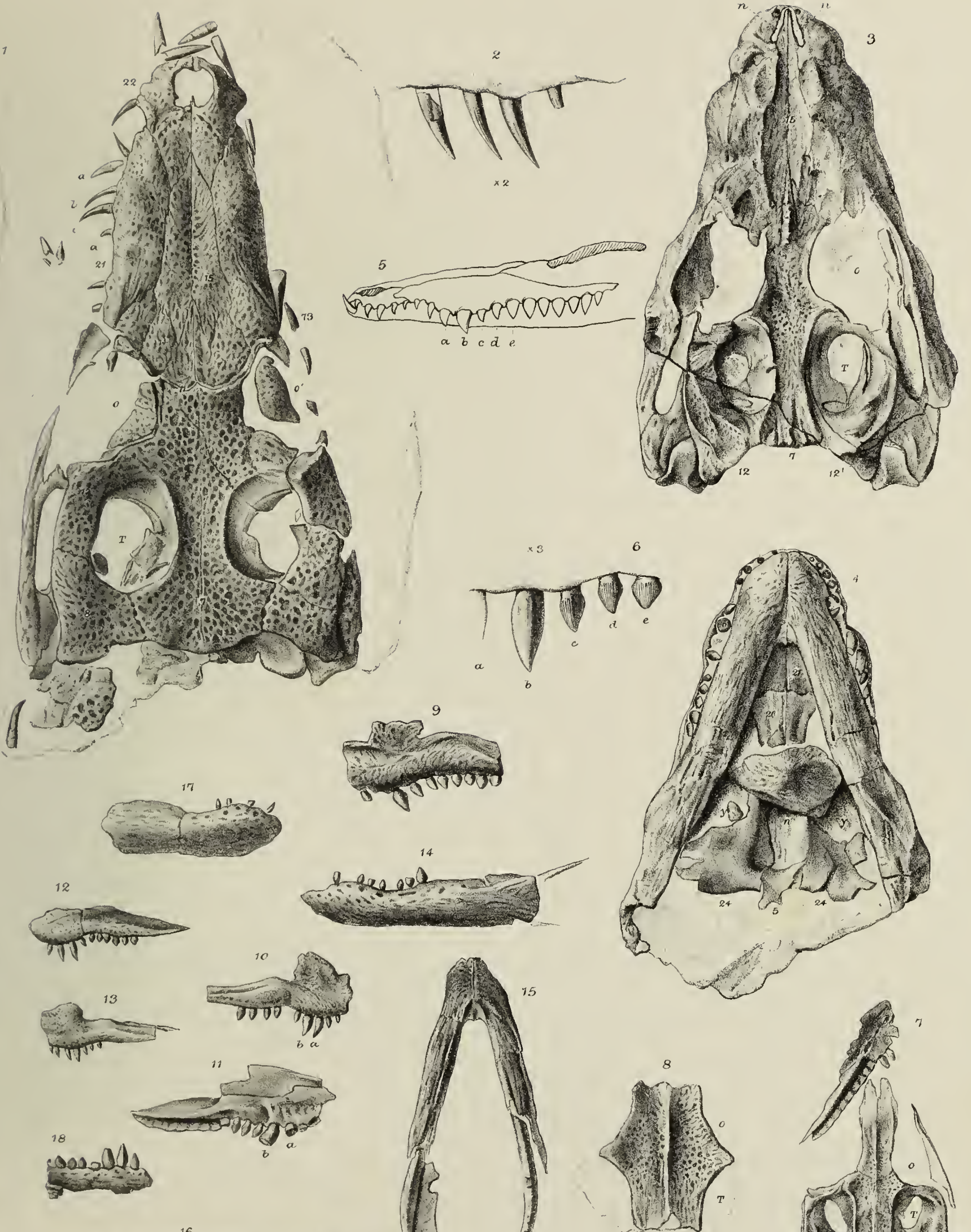
FIG.

1. Upper view of skull of *Nannosuchus gracilidens.*
2. Crowns of four teeth, *a*, *b*, *c*, *d*, in fig. 1, magnified 2 diameters.

Genus—THERIOSUCHUS.

3. Upper view of skull of *Theriosuchus pusillus.*
4. Under view of the same skull.
5. Side view of facial part of the same skull.
6. Crowns of five teeth, *a*, *b*, *c*, *d*, *e*, in fig. 5, magnified 3 diameters.
7. Upper view of cranium and inner view of left maxillary, *Theriosuchus pusillus.*
8. Frontal bone, *Theriosuchus pusillus.*
9. Part of left maxillary, ib.
10. Part of right maxillary, ib.
11. Left maxillary, inner side view, ib.
12. Right maxillary, young individual, ib.
13. Right maxillary, young individual, ib.
14. Left dentary, side view, mature individual.
15. Dentary and angular parts of mandible, under view, ib.
16. Dentary and fragments of mandible, inner side view, ib.
17. Fore part of right dentary, side view, ib.

The figures are of the natural size save where otherwise expressed.
From the Middle Purbeck; in the British Museum.



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1, 2, Nannosuchus; 3-16, Theriosuchus.

PLATE IV.

Theriosuchus pusillus.

Fig.

1. Portion of skull, trunk-vertebræ, and bones of fore limbs.
2. Bones of right hind limb and ridged caudal scutes of the same skeleton.
3. An unridged scute with peg, *a*.
4. Under surface of a scute, showing peg and groove, *b*.

All the figures are of the natural size.
From the Middle Purbeck; in the British Museum.

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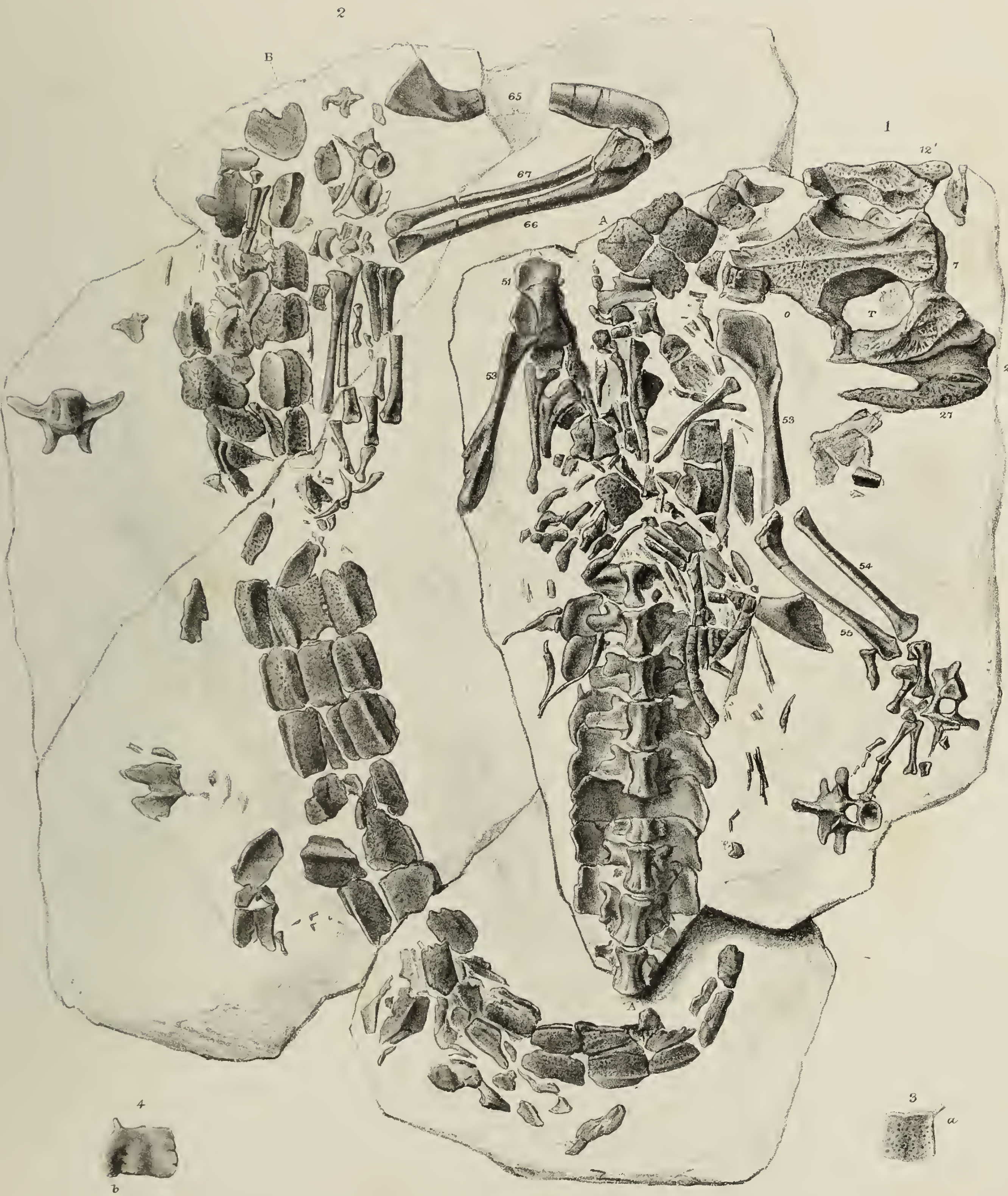

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Theriosuchus